Quality Assurance

During the drilling of the bore hole at 10-foot intervals and formation changes, or as directed by the geologist, the contractor will take representative samples of drill cuttings from the interval and shall place cuttings in suitably labeled sealable zip-lick plastic bags supplied by the contractor. The contractor shall coordinate and establish with the geologist the sampling program and method used prior to the start of the sampling routine. The contractor will receive approval of the sampling method by the geologist prior to drilling. All bags shall be labeled to indicate the sample depth interval, date, time and well number of the collected sample. The samples shall be properly stored by the contractor in a manner as to prevent breakage or loss until they are accepted by the geologist for further classification.

The contractor shall continuously monitor both cuttings and drilling fluid for the presence of petroleum hydrocarbons using a long wavelength ultraviolet lamp (230 $\mu W/cm^2$). If petroleum hydrocarbons are detected in the said samples, the contractor shall stop the drilling operations immediately and notify the consultant. A bentonite plug shall be placed at the bottom of the borehole after it has been reamed to its final diameter in order to prevent upward migration of any petroleum hydrocarbons.

Before each pilot hole is reamed to its final diameter, the contractor will furnish necessary labor, time and equipment to perform a plumbness survey, sieve analysis and electric log of each pilot hole. After the hole has been reamed, the contractor shall furnish necessary labor, time and equipment to perform a caliper log of the final borehole diameter.

ID4's consultant and/or geologist will provide continuous inspection during the entire construction phase of the contract.

All analytical data collected during this project will be reviewed by ID4's Quality Assurance/Quality Control Officer following ID4's Quality Assurance Manual (Attachment 8.2) and Water Quality Monitoring Plan (Attachment 8.3).

The preliminary contract documents including bid documents, general specifications, technical specifications and detail drawings for the construction of the monitoring wells are attached as Attachment 5.2. Excerpts from the Technical Specifications are included below:

MATERIALS

General

1. All materials shall be new, in good conditions and shall be supplied by the contractor unless otherwise stated in the contract documents.
2. The contractor shall inspect all materials for workmanship and/or manufacturing defects prior to installation and/or use; all defects shall be brought to ID4's attention at the time of discovery.

Cement, Grout, and Concrete

1. All cement used on the work shall be standard brand Portland cement conforming to the "Specifications for Portland Cement" (ASTM Designation C150) Type II.
2. All net cement grout, sand cement grout or concrete shall conform to the specifications defined in Part, Section 9.D of DWR, Bulletin 74-90.
3. If the grout seal or concrete is to be furnished by a redi-mix supplier, the contractor will submit copies of the mix design to ID4 72 hours prior to placement.

Drilling Water

Potable water for construction will be provided by ID4 from the CVC approximately 300 feet to the north. Contractor shall make all arrangements to transport the water and shall, at his own expense, provide facilities for obtaining and conveying water from the forebay of CVC Pumping Plant No. 6 source to the point of use. The contractor shall be responsible for obtaining an encroachment permit from the Agency for this work.

Well Casing

The well casing shall be manufactured in accordance with the current ASTM Specifications D1785, including applicable parts with the following additions:

1. The diameter shall be a nominal 6 inches and of Schedule 80 PVC. All casing in the well shall be of uniform outside diameter and wall thickness.
2. Casing ends shall be flush-threaded with a rubber gasket to ensure a tight seal.
3. A "bullnose" cap shall be screwed on and/or reinforced with stainless steel screws. The bullnose shall be manufactured of the same materials as the 304 stainless steel well screen to which it is attached.
4. Casing and well screen mill specifications from the manufacturer shall be submitted by the contractor three days prior to installation.

Continuous Wound Wire Screen

1. The continuous wound rod-based wire well screens shall have a nominal diameter of 6 inches. The continuous wound wire well screen shall be manufactured by US Filter/Johnson Screens, St. Paul, Minnesota, or an approved equal.
2. The material specifications for the continuous wound rod-based wire well screen are detailed in the Technical Specifications.
3. The well screen specifications (e.g. opening between consecutive wires) may be modified by the geologist based upon field conclusions.

Filter Pack

Filter Pack shall be supplied by RMC Lonestar or equivalent. Material must be pre-approved by the geologist. The anticipated gradation is #30 Monterey sand and shall be composed of sound, durable,

well-rounded particles, containing no silt, clay, organic matter or deleterious materials. The final filter pack gradation shall be determined after drilling the initial borehole. The contractor shall provide a certification of gradation from the supplier of the filter pack material to be used. The filter pack shall be delivered to the well site in super sacks and shall be number sequentially. Each numbered super sack shall be labeled with the weight of the material to the nearest pound and with the filter pack gradation.

Bentonite Seals

Chipped bentonite shall be supplied by Baroid, or approved equivalent, with a gradation size of 3/8-inch. Material shall be delivered onsite in bags of 50 to 100 pounds. The bentonite chips shall be covered to protect from rain and moisture. No previously hydrated bentonite shall be installed in the annular space of the borehole.

COMMUNICATION AND NOTIFICATION OF COUNTY & GEOLOGIST REPRESENTATIVES

The contractor shall maintain cellular telephone service at the work site at all times during construction activities. The contractor shall give notice to ID4 and the geologist in writing or by telephone of specific operations as follows:

1. At least seventy-two (72) hours advance notice of intent to start drilling, construction, development or other project-related operations.
2. Twenty-four (24) hours advance notice of scheduling the geophysical and mechanical logs.
3. Immediate notification by telephone if operations are discontinued or when work is resumed after a stoppage.

GEOPHYSICAL LOGGING

The contractor shall perform all work and furnish all labor, materials, equipment and services required to conduct the geophysical logging of the test hole as specified herein. Results of said logs will be provided to the geologist in digital ASCII format, as well as hard copies in American Petroleum Institute (API) format, vertical scale of 1-inch equals 50 feet linear and logarithmic plots.

All geophysical logs shall be the responsibility of one subcontractor. The subcontractor must submit to the geologist a current calibration of all tools for approval by the geologist and perform field calibration or repeat sections to insure accuracy of the survey; they repeat section shall be shown on the log. Logging shall be conducted at rates approved by the geologist. The geologist must be present during all geophysical logging. One field copy of each log must be provided immediately to the geologist for interpretation.

Geophysical logs shall be made along the full depth of the deep borehole (up to 700 feet) for each set of monitoring wells. As a minimum, the logs shall consist of:

1. Spontaneous Potential Log.
2. Short Normal and Long Normal Resistivity Log (16 and 64 inch spacing).
3. Single Point Resistivity Log, and

4. Spectral Gamma Log, utilizing a six (6) inch crystal.